

Microbiology – Lecture 10

Fungi and their pathogenesis

TEAM 437

Ibrahim

Red: important

Green : doctor notes

Black : original slides

Grey: extra information

In this link, you will find any corrections or notes unmentioned in the team's work. Please check the link below frequently.

https://docs.google.com/presentation/d/1yIQ3G8UDFG6xYMRhXkTk-dS54NeTfhJaPe_y0M-kjk/edit?usp=sharing



Objectives

- To describe the general characteristics of fungi and recognize a fungus from all other living organisms
- To establish familiarity with the terminology needed by medical students
- To know certain fundamental facts about classification reproduction and identification of fungi

What is Mycology?

Mycology: Study of fungi

Kingdom myceteae (= Kingdom fungi)

Medical mycology: Study of medically important fungi and the mycotic diseases.

Mycoses: A disease caused by a fungus

What is a Fungus ?

Characteristics of fungi:

- 1) All Eukaryotic organisms (a true nucleus)
- 2) Heterotrophic (doesn't make their own food)
(Saprobic, symbiotic, parasitic)
- 3) Do not have chlorophyll (Achlorophyllous)
- 4) The cell is surrounded by rigid cell wall made of chitin and complex carbohydrates (Mannan, glucan)
- 5) Cell membrane : (sterol, ergosterol)

Characteristics of fungi (distinguishing features):

Saprobic: feed on dead tissues or organic waste (decomposers)

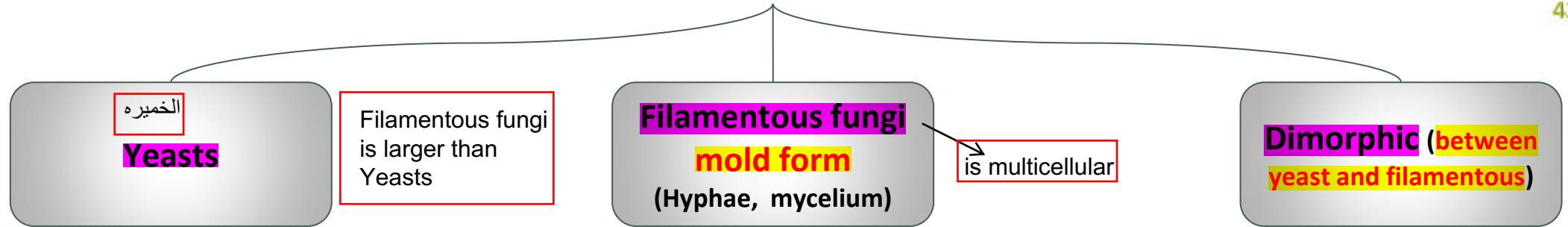
Symbiotic: mutually beneficial relationship between a fungus and another organism

Parasitic: feeding on living tissue of a host. (disease)

[More info on fungi](#)



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❖ are unicellular organisms

(round oval)

❖ Colony morphology (Culture)

Examples : *Candida albicans* (found as normal flora)

Saccharomyces cerevisiae (found in baking powder)

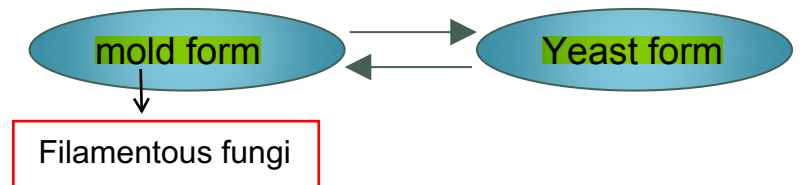
❖ Yeast is 5 times larger than bacteria

Hyphae are multicellular filamentous structures, constituted by tubular cells with cell walls.

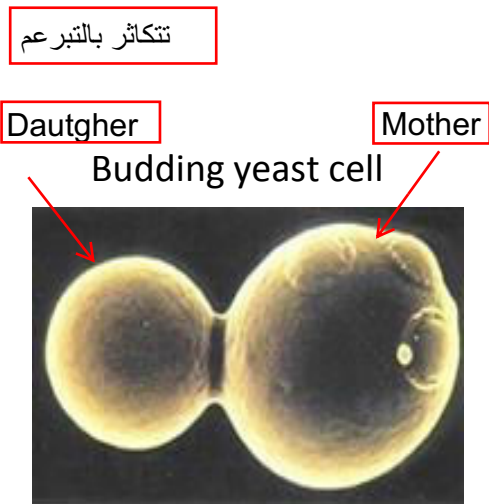
• **Yeast** : Parasitic form, Tissue form, Cultured at 37°C

• **Filamentous** : Saprophytic (micro-organisms that live on dead or decomposing matter) form, Cultured at 25 C

Dimorphic: Have two forms depending on change in the environmental factors :



Clinical samples :
Budding yeast cells
+/- Pseudohyphae



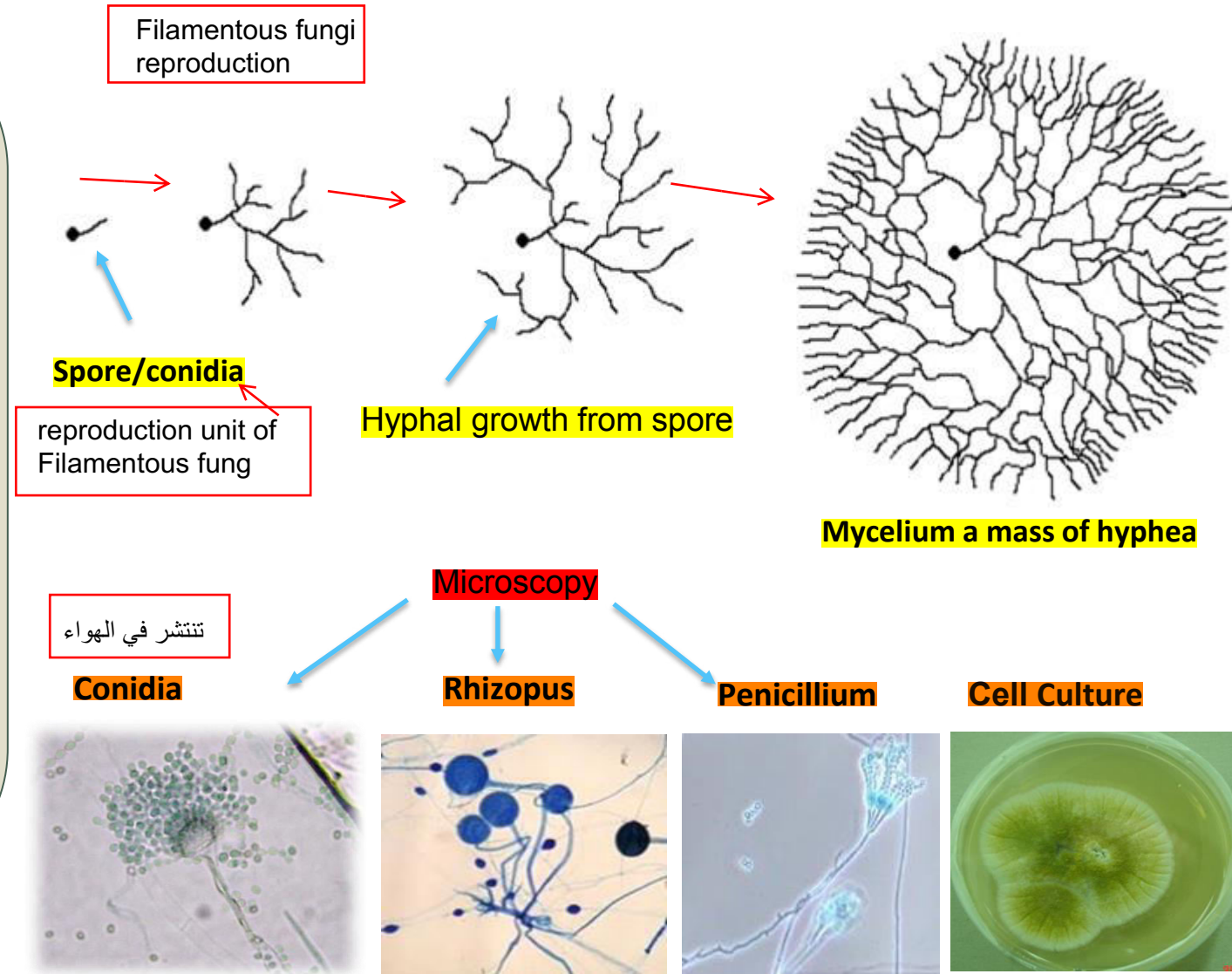


Morphology Of Filamentous Fungi (mold)

- ❖ **A hypha** (plural hyphae) is a long, branching filamentous cell. hyphae are the main mode of vegetative growth.
- ❖ **Mycelium:** The intertwined mass of hyphae that forms the fungal colony.
- ❖ **Conidia/ Spore:** (singular=**conidium**) asexual spores borne externally on hyphae or on a conidiophore.

Examples:

- **Aspergillus** very common pathogenic filamentous fungi
- Penicillium** synthesize penicillin
- Rhizopus** causes black bread mold





Filamentous fungi

colors could be different

conidia
hyphae

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Moniliaceous molds

hyaline or lightly pigmented conidia
or hyphae, colorless



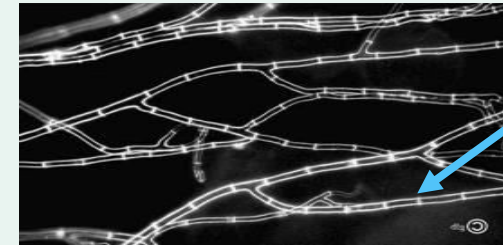
Dematiaceous Mold

Are **pigmented**.
Because of the pigment, the
colonies appear dark, brown, or
black



Fungal Hypha

Septate
hypha



Septa :

1) Septate-hypha: Cross-walls
(septa) that divide hyphae into
segments

2) Non-septate: If there are no
cross-walls



Reproduction in fungi



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spores is one way of the
fungi to reproduce

Spores can remain
dormant till the conditions
are favorable for it to
grow.

normally you can
found fungi in soil

Asexual: Only mitotic cell division

1) Somatic (production of daughter
cell, genetically the same)

2) Spore formation:

1. Yeasts by budding.
2. Molds by hyphal fragmentation

1. Sporangiospores in sporangia
2. Chlamydospores in or on hyphae
3. Conidia (conidium) on hypha or on
conidiophores

• Spores

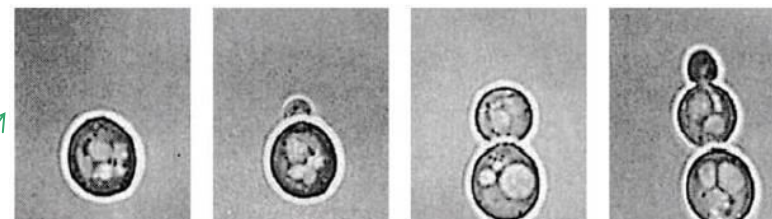
-These are the **small** airborne particles by
which fungi reproduce.

-They are produced by mitosis and readily
disseminate in the **air**.



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Sexual: Fusion, mitosis, meiosis



Spore produces filaments
which grow to mycelium.



Pathogenicity of fungi

Fungi are all around us

Widely distributed in nature (air, water, soil, decaying organic debris)

Fungi can cause diseases to humans

or allergy

- I. Cause superficial infections,
- II. some can cause allergic reactions
- III. Few cause invasive infections

To cause the disease:

1. Thermotolerance

2. Ability to survive in tissue environment

3. Ability to withstand host defenses

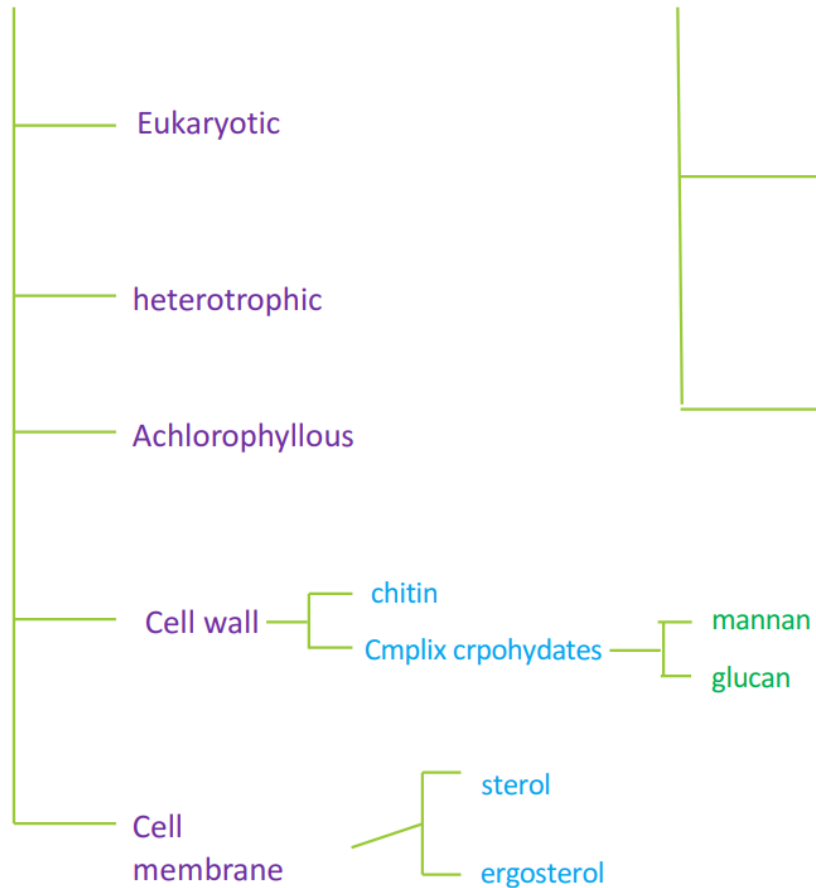
Not all fungi are pathogenic

If fungi cannot live at 37 degrees then it cannot cause diseases in humans, it may cause superficial diseases though

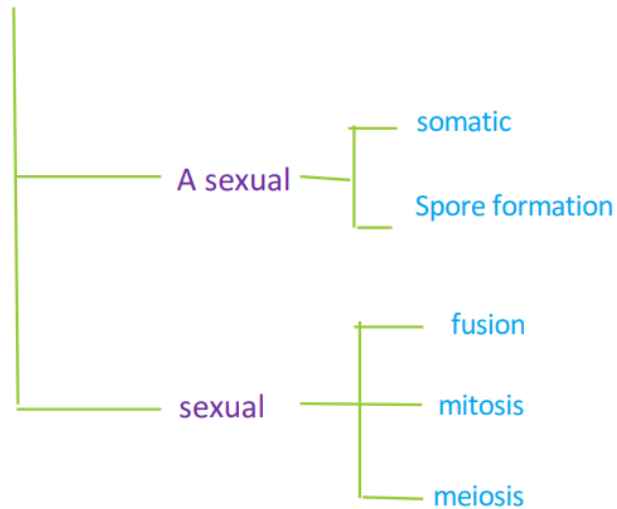


Fungi

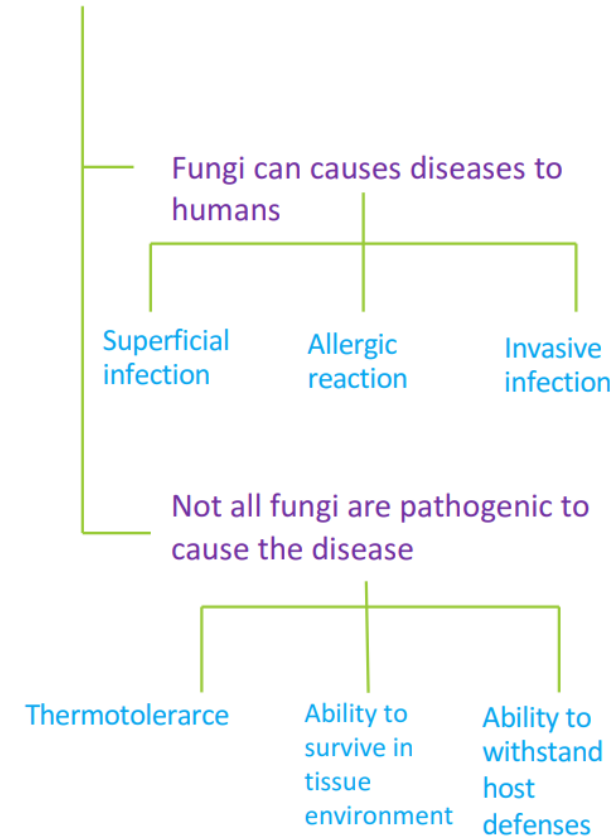
Characteristic of fungi



Reproduction in fungi



Pathogenicity of fungi



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Quiz and references

1- Cell wall of fungi is made of chitin and complex.....

A- Protein B- Carbohydrate D- Fatty acid

2..... are examples of fungi:

A- Actinomycosis B- Schistosomiasis C- Aspergillus

3.Fungi are prokaryotic organisms.

A- T B- F

4.Candidium is sexual spore.

A- T B- F

5.Mold divides asexually by

A- Hyphal fragmentation B- Budding C-fusion

6.Yeast is a multicellular organism

A- T B- F

7.Dermatiaceous molds are hyaline or lightly pigmented conidia.

A- T B- F

8.Cross cell wall can occur only in Non septate hypha

A- T B- F

9.Fungi divides sexually by

A- Spores. B- Somatic C- Mitosis



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لا يقوى الإنسان في الحياة على هذه الأرض من دون أن يعاونه الناس ويقفوا معه.



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